

DTIC FILE COPY

1

DEVELOPMENT OF SIZING SYSTEMS FOR NAVY WOMEN'S UNIFORMS

AD-A232 851



DTIC
ELECTE
MAR 13 1991
S B D

NAVY CLOTHING AND TEXTILE RESEARCH FACILITY

NATICK, MASSACHUSETTS

Approved for public release;
distribution unlimited.

Technical Report No. NCTRF 183

91 3 07 068

BEST

AVAILABLE

COPY

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</small>				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December, 1990		3. REPORT TYPE AND DATES COVERED Technical Report
4. TITLE AND SUBTITLE DEVELOPMENT OF SIZING SYSTEMS FOR NAVY WOMEN'S UNIFORMS			5. FUNDING NUMBERS	
6. AUTHOR(S) Robinette, Kathleen M., Sirvart A. Mellian, and Cay A. Ervin				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Armstrong Aerospace Medical Research Laboratory Wright-Patterson Air Force Base, Ohio 45433 Navy Clothing and Textile Research Facility Natick, Massachusetts 01760 Anthropology Research Project, Inc. Yellow Springs, Ohio 45387			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Navy Clothing and Textile Research Facility Natick, Massachusetts 01760			10. SPONSORING/MONITORING AGENCY REPORT NUMBER Technical Report No. 183	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) ✓ A proposed new sizing system for Naval women's clothing has been developed. Based on the findings of a sizing evaluation of current women's uniforms (Mellian et al., 1990), the new system is designed to (1) better accommodate the proportional diversity found among Navy women; particularly noted differences between White and Black women; (2) bring sizing for Navy women's clothing into closer conformity with commercial sizing, and (3) develop a single sizing system for all lower body garments. Sizing tables for the proposed system presented in this report, are based in part on proposed new commercial standards and include sizes to accommodate short, medium, and tall women as well as proportional variations represented by junior, misses, and women's hip sizes. An explanation of how various design values were arrived at is also included in this report. The authors caution that the proposed system is as yet untried and recommend thorough fit-testing before wholesale use is made of it.				
14. SUBJECT TERMS Anthropometric sizing Clothing Navy		Sizing Sizing system Women		15. NUMBER OF PAGES 46
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT	

PREFACE

This research project was sponsored by the U.S. Navy Clothing and Textile Research Facility (NCTRF) and jointly conducted by the U.S. Air Force Armstrong Aerospace Medical Research Laboratory (AAMRL) and NCTRF. Editorial support was provided by Anthropology Research Project, Inc. (ARP), under contract to AAMRL and by NCTRF. Ilse Tebbetts at ARP edited various working drafts of this report and Donna Gray at ARP produced the manuscript. John Milotte of NCTRF edited the final draft.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input checked="" type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification _____	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES	iv
LIST OF TABLES	iv
PREFACE	vi
SUMMARY	1
INTRODUCTION	2
PROPORTIONAL DIFFERENCES	2
COMMERICAL SIZING PRACTICES	4
DEVELOPING THE SIZING PROGRAMS	7
Neck Circumference	7
Shoulder Circumference, Chest Circumference at Scye, Chest Circumference below Bust, Waist Back Length	7
Sleeve Inseam	11
Sleeve Outseam, Sleeve Length	11
Waist Height	11
Crotch Height	11
Crotch Length	11
Arm Circumference	13
Scye Circumference	13
Thigh Circumference	13
Rise	13
REFERENCE	26
APPENDIX A: Measurement Descriptions	27
APPENDIX B: Preliminary Sizing Tables in Development of a Sizing Program for Navy Women's Uniforms	29

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Plot of Waist Circumference and Hip Circumference of Navy sample	6
2	Size Categories for Upper Body Based Upon Key Dimensions (Inches)	9
3	Size Categories for Lower Body Based Upon Key Dimensions (Inches)	10
4	Plot of Waist Back Length and Sleeve Inseam Length	12
5	Final Sizes Size Prediction Chart for Lower Body Garments (Inches)	24
6	Final Sizes Size Prediction Chart for Upper Body Garments (Inches)	25

LIST OF TABLES

<u>Table</u>		
1a	Discriminant Analysis Pairwise Squared Generalized Distances Between Groups	3
1b	Discriminant Analysis Linear Discriminant Function	3
2	ASTM-Proposed	5
3	Key Sizing Dimensions 18-Size System	8
4	Proposed Sizing System for Navy Women's Clothing (cont'd) Misses Petite	15
	Proposed Sizing System for Navy Women's Clothing (cont'd) Misses Regular	16
	Proposed Sizing System for Navy Women's Clothing (cont'd) Misses Tall	17
	Proposed Sizing System for Navy Women's Clothing (cont'd) Women's Petite	18
	Proposed Sizing System for Navy Women's Clothing (cont'd) Women's Regular	19

LIST OF TABLES (Cont'd)

<u>Table</u>		<u>Page</u>
4	Proposed Sizing System for Navy Women's Clothing (cont'd) Women's Tall	20
	Proposed Sizing System for Navy Women's Clothing (cont'd) Juniors Petite	21
	Proposed Sizing System for Navy Women's Clothing (cont'd) Juniors Regular	22
	Proposed Sizing System for Navy Women's Clothing (cont'd) Juniors Tall	23

SUMMARY

A sizing evaluation of six items of Navy women's uniform clothing, conducted in an earlier study (Mellian et al., 1990), turned up a number of design and sizing problems inherent in the clothing itself. Garments included in the study were the service dress blue coat, slacks, and skirt, the summer white skirt and slacks, and the short-sleeved white blouse. New sizing systems for these garments were devised with a view toward (1) better accommodating the proportional differences found among Navy women, (2) bringing Navy clothing sizes into closer conformity with commercial sizing, and (3) developing a single sizing system for all lower body garments.

The chief source of proportional differences among Navy women appeared to investigators in the earlier study to be differences between Black and White women. Further statistical studies of the original Navy women's sample and of a larger military data base confirmed that for the same height and hip size, Black women have slightly smaller waists, shorter rises, similar posterior crotch length and total crotch length, and higher buttock points than do White women. For clothing applications this means that Black women not only require a shorter rise but a point of maximum hip circumference should be higher in relation to the rise length. It was also established that Blacks require longer sleeves and pants legs for the same torso sizes than do Whites.

Separate sizing systems were considered infeasible. Instead, new sizing systems were developed to accommodate both races better. This was done by having garment lengths based on torso-to-height proportions rather than just on height, and by providing longer sleeve and leg lengths.

Commercial sizing practices were examined and found to offer a considerably wider variety of proportions than are currently available to Navy women. That is, for the same waist size women can choose commercial clothing in junior sizes (narrow hips), misses sizes (medium hips) or women's sizes (wide hips). The American Society for Testing and Materials (ASTM) is currently developing standard sizing systems for commercial clothing. An analysis of proposed ASTM misses sizes (the only ones available at the time this study was conducted) indicated that these sizes fall almost exactly in the center of the distribution of Navy women.

A series of sizing procedures were then undertaken to arrive at proposed new sizing systems for the six Navy garments under study. Proposed ASTM misses values were used as a starting point, and the observations and data gathered in the two studies of Navy women were used to modify design values accordingly.

Sizing tables for the proposed system include sizes to accommodate short, medium, and tall women as well as proportional variations represented by junior, misses, and women's hip sizes. Thorough fit-testing should be conducted before any wider use is made of these recommended values.

DEVELOPMENT OF SIZING SYSTEMS FOR NAVY WOMEN'S UNIFORMS

INTRODUCTION

This research is part of a larger effort focused on evaluating and developing sizing programs for Navy women's clothing. The initial study (Mellian, Ervin, and Robinette, NCTRF/TR No. 182, 1990) dealt with evaluating the size and fit of Navy women's uniforms and developing size prediction charts to guide individuals in selecting uniforms of best fit. In this second phase of the research, described in this report, observations and data from the first study were used to develop improved sizing systems from which new clothing can be designed.

In the earlier study, a team from the Navy Clothing and Textile Research Facility (NCTRF) evaluated six garments (service dress blue coat, slacks, and skirt, summer white skirt and slacks, and short-sleeved white blouse). Subjects were asked to try on the six garments and the size of best fit was determined. Body size dimensions crucial to the design of clothing were also measured on a representative sample of 906 Navy women. (See Appendix A for a description of the measured dimensions.) During the sizing evaluation some problems inherent in the design and sizing of the garments themselves emerged. For instance, the shoulder/arm area for coats seemed to be too small, and there did not appear to be a sufficient variety of waist and hip combinations to accommodate the different body types found among Navy women. It was also noted that the four lower body garments were all proportioned somewhat differently, and, as a result, the size of best fit for some women was different for each garment.

Observations and data gathered during the earlier evaluative phase of this research effort were used to develop experimental sizing systems. Goals for the new system were to:

- better accommodate the proportional diversity found among Navy women;
- bring sizing for Navy women's clothing into closer conformity with commercial sizing;
- develop a single sizing system for all lower body garments.

PROPORTIONAL DIFFERENCES

The chief source of proportional differences among Navy women appeared to investigators in the earlier study to be differences between Black and White women. To further understand these differences, a multivariate discriminant analysis was performed.

The results, shown in Tables 1a and 1b, confirm the existence of proportional differences between Black and White women in this sample. Table 1a indicates the distance (D^2) between the racial groups. Group 1 is White, Group 2 is Black, and Group 4 is Hispanic. There were too few members of Group 3 (Orientals) to use in the evaluation. It appears that the White and Black groups are farthest apart, ($D^2=3.13$), and that Hispanics and Blacks are nearly as far apart ($D^2=2.89$). The Hispanics and Whites are fairly close ($D^2=1.37$). Table 1b shows the linear discriminant function for each group. This is the equation that sorts the observations into groups based on their anthropometry. The numbers listed are the coefficients for the variables listed at the left. Differences in the coefficients from group to group can be used to indicate how the groups differ.

TABLE 1a. Discriminant Analysis Pairwise Squared Generalized
Distances between Groups
 $D^2(I|J) = (X_i - X_j)' \text{COV}^{-1} (X_i - X_j)$
Generalized Squared Distance To Race*

From Race*	1	2	4
1	0.00000000	3.12737069	1.36886300
2	3.12737069	0.00000000	2.89016587
4	1.36886300	2.89016587	0.00000000

TABLE 1b. Discriminant Analysis Linear Discriminant Function
Constant = $-.5 X', \text{COV}^{-1} X_j$ Coefficient Vector = $\text{COV}^{-1} X_j$
Race

	1	2	4
Constant	-451.32585902	-445.81504292	-428.50782852
Stature	15.66887670	14.86418292	15.45730389
Hip Circumference	-0.44976639	-0.31427587	-0.43060782
Neck Circumference	14.11574807	14.83364552	14.01260713
Shoulder Circumference	5.46675706	5.81847717	5.49240074
Chest Circumference at Seye	-0.96458717	-1.12220129	-0.54620983
Bust Circumference	0.60229260	0.58186722	0.44058998
Chest Circumference below Bust	1.55192098	0.87502620	1.19586235
Waist Circumference	-4.78386455	-4.62581619	-4.73002641
Waist Back	-1.19828219	-1.28008134	-1.50473546
Sleeve Inseam	3.00566034	3.75951389	3.36696009
Sleeve Outseam	-2.07765070	-1.58103840	-1.66022432
Sleeve Length	0.64541478	0.72680254	0.72108261
Waist Height	-5.83562038	-6.64602418	-6.42065026
Crotch Height	-6.01193680	-4.46628411	-5.97516857

- 1 = White
- 2 = Black
- 4 = Hispanic

Study of these differences reveal that for Whites and Blacks of equal stature Blacks tend to have longer limbs along with shorter torsos. For clothing applications this clearly suggests that Blacks require longer sleeves and pant legs for the same torso sizes. In addition, Blacks appear to be equal to Whites in waist height and, at the same time, longer in crotch height which means that the rise for Blacks is much shorter. This could mean that, for Blacks, the location of the maximum hip circumference measurement should be much higher with respect to the waist, and would explain certain fit problems in the hip region which occurred for Black women. The "fitted" coat gapped in the back on many Black women. This gap was probably caused by the fact that, for many Black women, the swell of the hip occurred higher up than for White women and the coat would have been tapered too narrowly at this point. There also appeared to be a problem with the pants "riding up" in the hip area. Again this would result when the largest part of the hip was higher with respect to the waist.

To further explore these problems, more specific lower torso data were needed, specifically, posterior crotch length measurements. A larger military data base with a larger number of lower trunk variables was utilized to evaluate the differences.

Analysis of the enlarged data base confirmed the following: for the same height and hip size, Black women have slightly smaller waists, shorter rises, similar posterior crotch length and total crotch length, and higher buttock points than do White women. This reemphasizes that, in terms of designing clothing that will better fit Black women, not only should the rise be shorter than for Whites but the point of maximum hip should be higher in relation to the rise length.

It was determined that the creation of separate sizing systems would require too many sizes and would not be feasible; rather, attempts would be made to be more accommodating to both races. This would be done by having garment lengths based on torso-to-height proportions rather than just on height, and providing longer sleeve and leg lengths. This means that, given two women of the same height, a Black woman might achieve a better fit in a petite, while a White woman might wear a regular.

COMMERCIAL SIZING PRACTICES

Next, commercial sizing practices were examined. During the fit tests many subjects had complained that the size they wore in Navy clothing was not the size they wore in commercial clothing. Also, unlike current Navy sizing systems, commercial sizing is available in a wide variety of proportions; i.e., for the same size waist women can choose from juniors (which have narrow hips), misses (regular hips), or women's (larger hips). The American Society for Testing and Materials (ASTM) is currently developing standard sizing systems for commercial clothing. By incorporating some of the proposed ASTM standards, the Navy clothing sizing system should more closely resemble commercial sizing. However, at the time of this study, the ASTM standards were still under development and only the proposed misses dimensions were available. Table 2 shows the proposed ASTM standards used in this sizing analysis.

To determine the feasibility of utilizing ASTM standards to develop lower body sizing, ASTM misses waist and hip circumferences were plotted on a bivariate table showing the distribution of Navy women (see Figure 1). The ASTM misses sizes are indicated by squares. The crosses (+) indicate the location of individual Navy women. As can be seen, the ASTM sizes fall almost directly in the center of the distribution of Navy women, making this a good starting point for creating a sizing system for Navy women's clothing.

**TABLE 2. ASTM-Proposed
Body Size Measurements: Misses
(inches)**

	2	4	6	8	10	12	14	16	18
Bust Circumference	31 ^{1/2}	32 ^{1/2}	33 ^{1/2}	34 ^{1/2}	36	37 ^{1/2}	39	41	43
Waist Circumference	23 ^{1/2}	24 ^{1/2}	25 ^{1/2}	26 ^{1/2}	28	29 ^{1/2}	31	33	35
Scoye Circumference	13 ^{1/4}	13 ^{3/4}	14 ^{1/4}	14 ^{3/4}	15 ^{3/8}	16	16 ^{5/8}	17 ^{3/8}	18 ^{1/8}
Upper Arm Circumference	9 ^{5/8}	10	10 ^{3/8}	10 ^{3/4}	11 ^{1/4}	11 ^{3/4}	12 ^{1/4}	12 ^{7/8}	13 ^{1/2}
Arm Length Center Back Neck	29 ^{5/8}	29 ^{7/8}	30 ^{1/8}	30 ^{3/8}	30 ^{11/16}	31	31 ^{5/16}	31 ^{5/8}	31 ^{15/16}
Across Shoulder	14 ^{3/8}	14 ^{5/8}	14 ^{7/8}	15 ^{1/8}	15 ^{1/2}	15 ^{7/8}	16 ^{1/4}	16 ^{5/8}	17
Across Back	13 ^{7/8}	14 ^{1/8}	14 ^{3/8}	14 ^{5/8}	15	15 ^{3/8}	15 ^{3/4}	16 ^{1/4}	16 ^{3/4}
Back Waist Length	15 ^{7/8}	16	16 ^{1/8}	16 ^{1/4}	16 ^{1/2}	16 ^{3/4}	17	17 ^{1/4}	17 ^{1/2}
Front Length H.P.S.	19 ^{1/2}	19 ^{3/4}	20	20 ^{1/4}	20 ^{5/8}	21	21 ^{3/8}	21 ^{3/4}	22 ^{1/8}
Total Height	64	64	64	64	64	64	64	64	64
Neck Circumference at Base	13 ^{1/2}	13 ^{3/4}	14	14 ^{1/4}	14 ^{5/8}	15	15 ^{3/8}	15 ^{7/8}	16 ^{3/8}
High Hip Circumference	31	32	33	34	35 ^{1/2}	37	38 ^{1/2}	40 ^{1/2}	42 ^{1/2}
Hip/Seat Circumference	34	35	36	37	38 ^{1/2}	40	41 ^{1/2}	43 ^{1/2}	45 ^{1/2}
Thigh	19 ^{3/4}	20 ^{1/4}	20 ^{3/4}	21 ^{1/2}	22 ^{1/2}	23 ^{1/2}	24 ^{1/2}	25 ^{3/4}	27
Leg Length (Waist to Floor)	39 ^{7/8}	40	40 ^{1/8}	40 ^{1/4}	40 ^{1/2}	40 ^{3/4}	41	41 ^{1/4}	41 ^{1/2}
Crotch to Floor	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}	29 ^{1/2}
Rise	10 ^{3/8}	10 ^{1/2}	10 ^{5/8}	10 ^{3/4}	11	11 ^{1/4}	11 ^{1/2}	11 ^{3/4}	12
Crotch Length	25 ^{1/2}	26	26 ^{1/2}	27	27 ^{3/4}	28 ^{1/2}	29 ^{1/4}	30	30 ^{3/4}

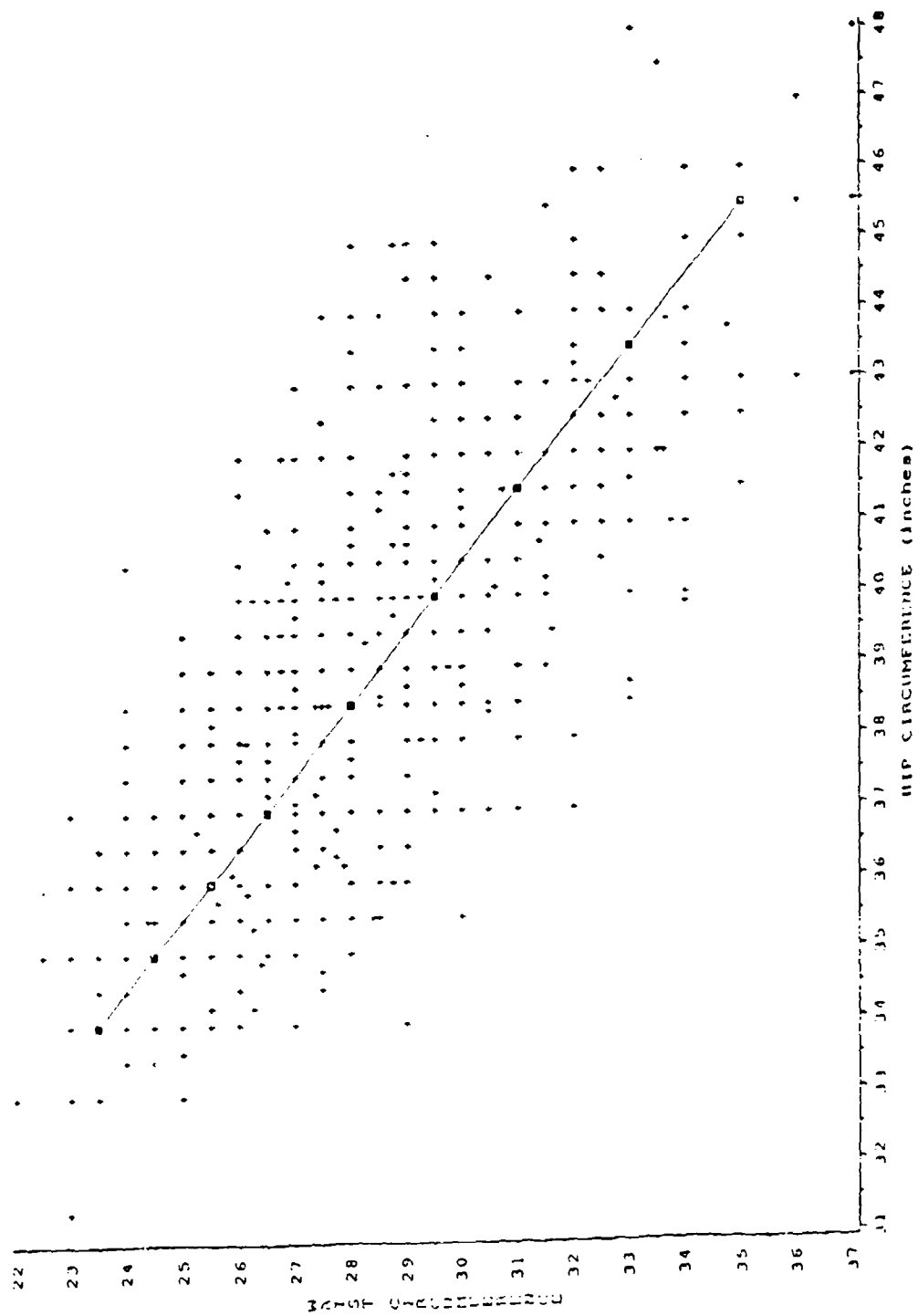


Figure 1
 Plot of Waist Circumference and Hip Circumference of Navy sample.
 (ASTM Misses Sizes Indicated by Squares)

DEVELOPING THE SIZING PROGRAMS

It was noted in the previous study that additional room was needed at given bust or waist sizes by many women. In other words greater variety of garment shapes was required. To achieve this, women's and junior hip adaptations were developed from the ASTM misses sizes. Three inches were added to the hip for women's sizes and two inches were subtracted for junior sizes. These adaptations were not deemed necessary for all sizes, given the distribution of women. Women's sizes were added for sizes 4 to 14 and junior sizes for sizes 10 to 16.

Four measurements were selected as "key", or sizing, dimensions: bust circumference, waist circumference, hip circumference, and height. The resulting sizes in terms of these key dimensions are shown in Table 3 and in Figures 2 and 3. In the figures, the lower right corner of each size category represents the key dimension values for the size. The categories extend to cover all the individuals in the sample who are smaller than the key dimension values, and constitute an educated guess at who will wear the size. The actual clothing size worn will vary depending upon design, ease, and fabric.

Proposed ASTM values for bust and waist circumference were combined with the three sets of hip circumferences and three stature values (Petite = 63.5", Regular = 67", Tall = 70") in four-step regression equations to arrive at sizing values for other variables in the 18-size system. Due to noted differences between the races, Blacks and Whites were calculated separately. The values are shown in Appendix B (Table B-1).

The next phase involved developing a composite sizing system, i.e., one which used data from the Whites as a base but incorporated data from Blacks (see Appendix B, Table B-2).

Regressed values shown in Table B-1 represent the average value (50th percentile) for that variable. Practical considerations dictated that many of these values be adjusted to accommodate a larger segment of the population. This was done by multiplying selected normal probability values by the error term and adding to, or subtracting from, the regressed mean. Adding and subtracting "1 x the error term" will give (roughly) the range for the middle two-thirds of the population. Adding and subtracting the "error term x 2.33" will give a range approximating the middle 90 percent or the 5th to 95th percentile. In the development of the composite program it was often assumed that taking a garment in is easier than letting it out, so larger values were selected. Where there were no significant differences between Blacks and Whites White values were used for calculation purposes. The manner in which each variable was developed for the final composite sizing system is described below.

Neck Circumference

Because the Black values were larger than the White values, the composite size was developed from the Black values plus 1.25 inches (error term x 2.33).

Shoulder Circumference, Chest Circumference at Syle, Chest Circumference below Bust, Waist Back Length

For these measurements, no significant differences were found between Blacks and Whites. Because the majority of the population is White, White values were selected. These variables

**TABLE 3. Key Sizing Dimensions: 18-Size System
(Inches)**

MISSES

Size	Bust Circ	Waist Circ	Hip Circ
4	32 ^{1/2}	24 ^{1/2}	35
6	33 ^{1/2}	25 ^{1/2}	36
8	34 ^{1/2}	26 ^{1/2}	37
10	36	28	38 ^{1/2}
12	37 ^{1/2}	29 ^{1/2}	40
14	39	31	41 ^{1/2}
16	41	33	43 ^{1/2}
18	43	35	45 ^{1/2}

WOMEN'S

Size	Bust Circ	Waist Circ	Hip Circ
4	32 ^{1/2}	24 ^{1/2}	38
6	33 ^{1/2}	25 ^{1/2}	39
8	34 ^{1/2}	26 ^{1/2}	40
10	36	28	41 ^{1/2}
12	37 ^{1/2}	29 ^{1/2}	43
14	39	31	44 ^{1/2}

JUNIORS

Size	Bust Circ	Waist Circ	Hip Circ
10	36	28	36 ^{1/2}
12	37 ^{1/2}	29 ^{1/2}	38
14	39	31	39 ^{1/2}
16	41	33	41 ^{1/2}

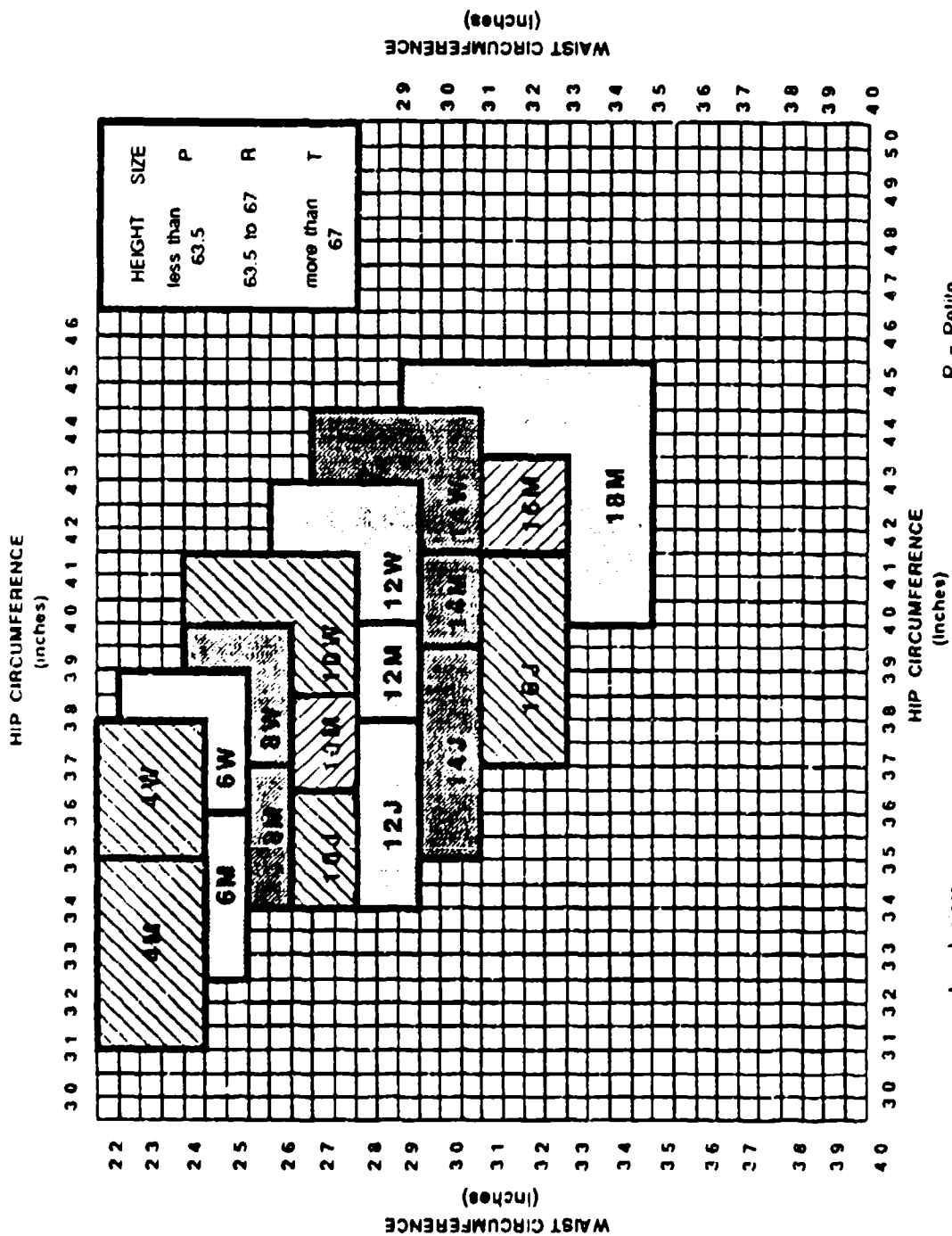


Figure 3
Size Categories for Lower Body Based upon Key Dimensions. (Inches)

J = Juniors
M = Misses
W = Women

P = Petite
R = Regular
T = Tall

are not particularly critical to the fit of the garment (and are related to bust circumference which is used as a key dimension) so no adjustments were made.

Sleeve Inseam*

In order to accommodate Blacks, who tend to have longer arms and shorter torsos than Whites, a common inseam sleeve value was selected for all sizes of a given length as shown in Figure 4. This is a bivariate table of waist back length (used as a torso length measurement) and sleeve inseam length with subjects plotted in terms of race values (1 = Whites, 2 = Blacks). The three lines represent Petite, Regular, and Tall coats. The symbols in the middle of the lines show sleeve hem length, and the line extensions represent the alteration ranges. That is, the Size 6 Petite jacket would have the same (adjustable) sleeve length as the Size 14 Petite. As noted, the garment lengths are based largely on torso length and so, conceivably, taller Blacks could actually get a better fit in a Petite coat if it has longer sleeves.

Sleeve Outseam, Sleeve Length**

The values were developed from an additional three-step regression equation using the sleeve inseam, scye circumference, and chest circumference values for each size as input. The values from this additional equation were used so the related sleeve variables would fit together.

Waist Height

This value was derived by adding crotch height and rise.

Crotch Height

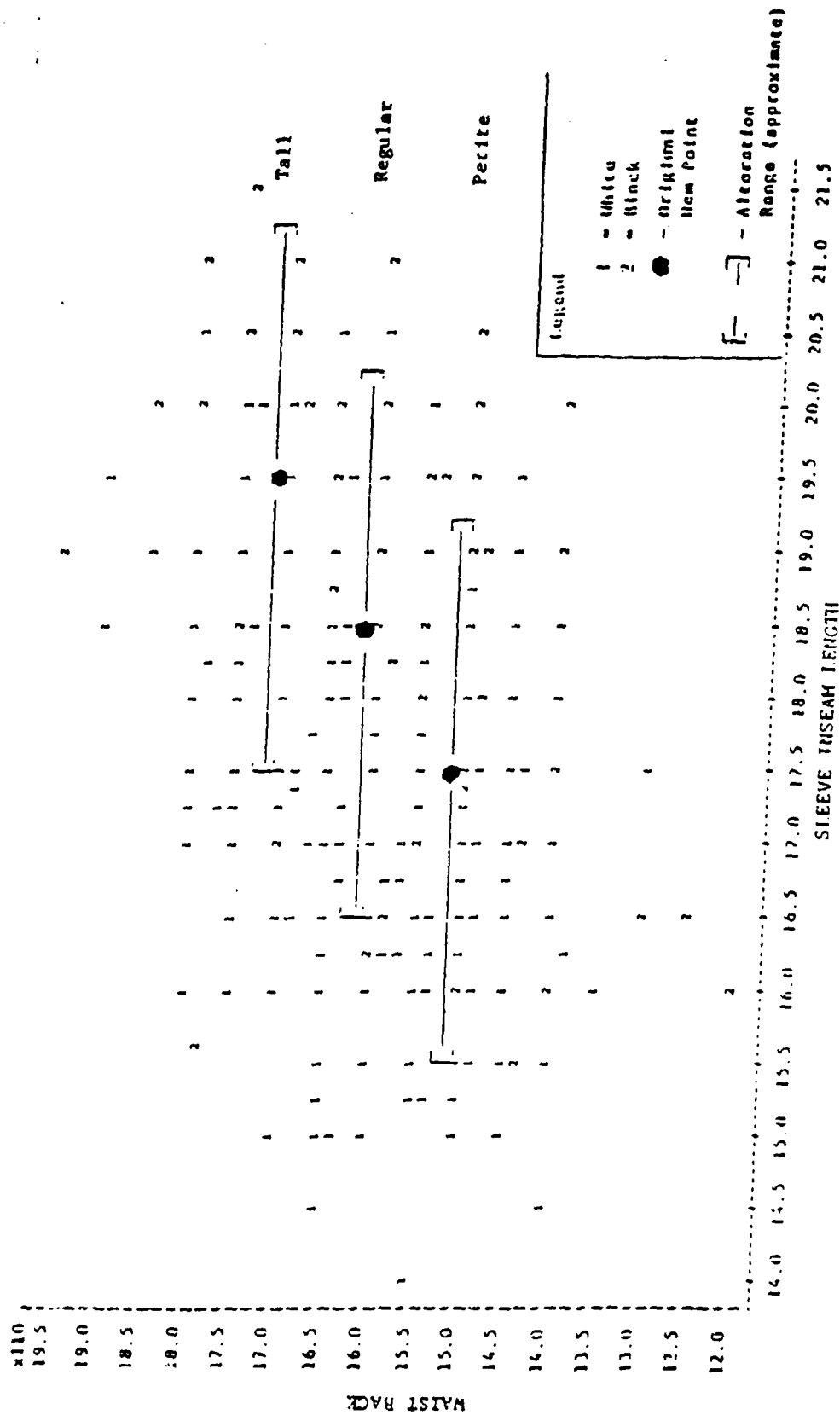
For this variable the 95th percentile value for Blacks was used for all sizes and lengths on the assumption that shortening slacks is easier than lengthening them. Again, this was done to accommodate Blacks who have longer legs but who would wear Petite sizes because of shorter rise values.

Crotch Length

This value is based on an additional four-step regression using rise, waist circumference, hip circumference, and stature values for each size as input. This was done so that the lower torso variables would fit together.

* This is a body measurement of inner arm length corresponding to the location of the sleeve inseam.

**These are body measurements of outer arm and spine-to-wrist lengths, respectively.



NOTE: 14 subjects had missing values; 819 subjects hidden.

Figure 4
Plot of Waist Back Length and Sleeve Inseam Length.

Arm Circumference

White values plus 1.38 inches (2.33 x error term) will allow accommodation for larger arms (an apparent problem in the current blue coat).

Sleeve Circumference

As with arm circumference, White values were used plus (2.33 x error term).

Thigh Circumference

Blacks appeared to have larger thigh circumferences, so those values plus (2.33 x error term) were used.

Rise

The concern for this variable was to accommodate a larger portion of the population without making it too long for Blacks. Rather than add the same error term adjustment to all three length values, we derived the rises for each of the three lengths differently. For Petite, the White value minus "1 x error term" (.74) was used. This should produce a better fit for Blacks. By keeping crotch height at the 95th percentile, Blacks with long legs could get a better fit wearing Petite sizes. Rise for Regular length remains as is, while rise for Tall is adjusted to accommodate people with longer rises: White value plus (2.33 x error term).

When the Navy Misses sizes are compared to ASTM sizes for dimensions other than the key sizing variables it appears that the Navy women have the following size characteristics:

- Larger Neck Circumferences for the smaller sizes (4, 6, 8).
Differences in neck circumference measurements decrease in the middle range of sizes and, finally, cross over; at size 18, Navy women have smaller Neck Circumferences.
- Smaller Crotch Lengths, with differences between the two groups increasing as the sizes increase.
- *Larger Arm Circumferences for all sizes.
- *Larger Thigh Circumferences for all sizes.
- Shorter Waist Back Lengths.
- Larger Sleeve Circumferences.

It should be noted that the above differences are a result of comparing only the Navy misses to ASTM misses values. The addition of the junior and womens sizes should provide greater accommodation.

*These were garment regions which were too small in current Navy garments.

The next step was working with pattern makers and graders from the Navy and industry to develop realistic grading for those dimensions required by pattern makers. Using the composite system as a foundation, adjustments were based on recommendations from pattern makers and graders with regard to the feasibility of indicated changes. For example, a 3-inch addition to the hip area was thought to be too extreme, and one that might result in an oddly curved garment. A two-inch addition was made, and a few sizes were added in exchange. The final numbers, calculated in terms of \pm differences from size 12, are given in Table 4. The data are shown in eighths of inches, the unit of measurement used by pattern makers. This final set of sizes are shown by key dimensions in Figures 5 and 6. As with Figures 2 and 3, the key dimension values for each size are represented by the lower right hand corner of each size category. A single category encloses all women in the sample who are smaller for both key dimensions, except those who are small enough to be included in a smaller category. This is an educated guess at who will wear each size. Actual clothing size will vary depending on design, ease, and fabric.

Two cautions should be emphasized for users of this sizing system: First, it is important to remember that the values in these tables are body measurements and that appropriate adjustments must be added for pattern making. Second, this sizing program is, as yet, experimental and should be thoroughly fit-tested before wholesale use is made of it.

TABLE 4. Proposed Sizing System for Navy Women's Clothing

Misses
Petite

	4	6	8	10	12	14	16	18	20
Neck Circumference	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{4}$	$-\frac{1}{4}$	$14\frac{7}{8}$	$+\frac{1}{4}$	$+\frac{3}{8}$	$+\frac{3}{8}$	$+\frac{3}{8}$
Shoulder Circumference	$-\frac{7}{8}$	$-\frac{7}{8}$	$-1\frac{1}{4}$	$-1\frac{1}{4}$	$42\frac{1}{2}$	$+1\frac{1}{4}$	$+1\frac{3}{4}$	$+1\frac{1}{4}$	$+\frac{3}{4}$
Chest Circumference at Scye	$-\frac{7}{8}$	$-\frac{7}{8}$	$-1\frac{1}{4}$	$-1\frac{1}{4}$	$35\frac{1}{2}$	$+1\frac{1}{4}$	$+1\frac{5}{8}$	$+1\frac{5}{8}$	0
Chest Circumference below Bust	$-\frac{3}{4}$	$-\frac{3}{4}$	-1	-1	$31\frac{7}{8}$	+1	$+1\frac{1}{4}$	$+1\frac{1}{4}$	$+1\frac{1}{4}$
Waist Back Length	$-\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{1}{4}$	$15\frac{1}{8}$	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$
Sleeve Outseam*	$-\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{1}{4}$	$22\frac{5}{8}$	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$	$+\frac{1}{4}$
Sleeve Length*	$-\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{3}{8}$	$-\frac{3}{8}$	$32\frac{3}{4}$	$+\frac{3}{8}$	$+\frac{1}{2}$	$+\frac{1}{2}$	$+\frac{1}{2}$
Sleeve Inseam*	0	0	0	0	$17\frac{1}{2}$	0	0	0	0
Waist Height	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$42\frac{3}{4}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{1}{8}$
Crotch Height	0	0	0	0	$32\frac{1}{4}$	0	0	0	0
Crotch Length	$-\frac{3}{8}$	$-\frac{3}{8}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$27\frac{5}{8}$	$+\frac{5}{8}$	$+\frac{3}{4}$	$+\frac{3}{4}$	0
Arm Circumference	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{5}{8}$	$-\frac{5}{8}$	$13\frac{1}{4}$	$+\frac{5}{8}$	$+\frac{7}{8}$	$+\frac{7}{8}$	0
Scye Circumference	$-\frac{3}{8}$	$-\frac{3}{8}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$19\frac{3}{4}$	$+\frac{1}{2}$	$+\frac{5}{8}$	$+\frac{5}{8}$	0
Thigh Circumference	$-\frac{3}{4}$	$-\frac{3}{4}$	$-1\frac{1}{8}$	$-1\frac{1}{8}$	$26\frac{5}{8}$	$+1\frac{1}{8}$	$+1\frac{1}{8}$	$+1\frac{1}{8}$	0
Rise	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$10\frac{1}{2}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{1}{8}$
Bust Circumference	-1	-1	$-1\frac{1}{2}$	$-1\frac{1}{2}$	$37\frac{1}{2}$	$+1\frac{1}{2}$	+2	+2	+2
Waist Circumference	-1	-1	$-1\frac{1}{2}$	$-1\frac{1}{2}$	$29\frac{1}{2}$	$+1\frac{1}{2}$	+2	+2	+2
Hip Circumference	-1	-1	$-1\frac{1}{2}$	$-1\frac{1}{2}$	40	$+1\frac{1}{2}$	+2	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Misses
Regular

	4	6	8	10	12	14	16	18	20
Neck Circumference	$-.1^8$	$-.1^8$	$-.1^4$	$-.1^4$	$14^{7.8}$	$+.1^4$	$+.3^8$	$+.3^8$	$+.3^8$
Shoulder Circumference	$-.7^8$	$-.7^8$	$-.1^{1.4}$	$-.1^{1.4}$	$42^{1.2}$	$+.1^{1.4}$	$+.1^{3.4}$	$+.1^{3.4}$	$+.1^{3.4}$
Chest Circumference at Scye	$-.7^8$	$-.7^8$	$-.1^{1.4}$	$-.1^{1.4}$	$35^{3.4}$	$+.1^{1.4}$	$+.1^{5.8}$	$+.1^{5.8}$	0
Chest Circumference below Bust	$-.3^4$	$-.3^4$	-1	-1	$31^{7.8}$	+1	$+.1^{1.4}$	$+.1^{1.4}$	$+.1^{1.4}$
Waist Back Length	$-.1^4$	$-.1^4$	$-.1^4$	$-.1^4$	$16^{1.8}$	$+.1^4$	$+.1^4$	$+.1^4$	$+.1^4$
Sleeve Outseam*	$-.1^4$	$-.1^4$	$-.1^4$	$-.1^4$	$23^{5.8}$	$+.1^4$	$+.1^4$	$+.1^4$	$+.1^4$
Sleeve Length*	$-.1^4$	$-.1^4$	$-.3^8$	$-.3^8$	$33^{3.4}$	$+.3^8$	$+.1^2$	$+.1^2$	$+.1^2$
Sleeve Inseam*	0	0	0	0	$18^{1.2}$	0	0	0	0
Waist Height	$-.1^8$	$-.1^8$	$-.1^8$	$-.1^8$	$44^{3.8}$	$+.1^8$	$+.1^8$	$+.1^8$	$+.1^8$
Crotch Height	0	0	0	0	$33^{1.4}$	0	0	0	0
Crotch Length	$-.3^8$	$-.3^8$	$-.5^8$	$-.5^8$	$28^{1.4}$	$+.5^8$	$+.3^4$	$+.3^4$	0
Arm Circumference	$-.3^8$	$-.1^2$	$-.5^8$	$-.5^8$	$12^{7.8}$	$+.5^8$	$+.7^8$	$+.7^8$	0
Scye Circumference	$-.3^8$	$-.3^8$	$-.1^2$	$-.1^2$	20	$+.1^2$	$+.5^8$	$+.5^8$	0
Thigh Circumference	$-.3^4$	$-.3^4$	$-.1^{1.8}$	$-.1^{1.8}$	$26^{3.8}$	$+.1^{1.8}$	$+.1^{3.8}$	$+.1^{3.8}$	0
Rise	$-.1^8$	$-.1^8$	$-.1^8$	$-.1^8$	$11^{1.8}$	$+.1^8$	$+.1^8$	$+.1^8$	$+.1^8$
Bust Circumference	-1	-1	$-.1^{1.2}$	$-.1^{1.2}$	$37^{1.2}$	$+.1^{1.2}$	+2	+2	+2
Waist Circumference	-1	-1	$-.1^{1.2}$	$-.1^{1.2}$	$29^{1.2}$	$+.1^{1.2}$	+2	+2	+2
Hip Circumference	-1	-1	$-.1^{1.2}$	$-.1^{1.2}$	40	$+.1^{1.2}$	+2	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Misses
Tall

	4	6	8	10	12	14	16	18	20
Neck Circumference	$-1/8$	$-1/8$	$-1/4$	$-1/4$	$14^{7/8}$	$+1/4$	$+3/8$	$+3/8$	$+3/8$
Shoulder Circumference	$-7/8$	$-7/8$	$-1^{1/4}$	$-1^{1/4}$	$42^{1/2}$	$+1^{1/4}$	$+1^{3/4}$	$+1^{3/4}$	$+1^{3/4}$
Chest Circumference at Scye	$-3/4$	$-3/4$	$-1^{1/4}$	$-1^{1/4}$	$35^{7/8}$	$+1^{1/4}$	$+1^{5/8}$	$+1^{5/8}$	0
Chest Circumference below Bust	$-3/4$	$-3/4$	-1	-1	$31^{7/8}$	+1	$+1^{1/4}$	$+1^{1/4}$	$+1^{1/4}$
Waist Back Length	$-1/4$	$-1/4$	$-1/4$	$-1/4$	$17^{1/8}$	$+1/4$	$+1/4$	$+1/4$	$+1/4$
Sleeve Outseam*	$-1/4$	$-1/4$	$-1/4$	$-1/4$	$24^{5/8}$	$+1/4$	$+1/4$	$+1/4$	$+1/4$
Sleeve Length*	$-1/4$	$-1/4$	$-3/8$	$-3/8$	$34^{3/4}$	$+3/8$	$+1/2$	$+1/2$	$+1/2$
Sleeve Inseam*	0	0	0	0	$19^{1/2}$	0	0	0	0
Waist Height	$-1/8$	$-1/8$	$-1/8$	$-1/8$	$46^{3/8}$	$+1/8$	$+1/8$	$+1/8$	$+1/8$
Crotch Height	0	0	0	0	$34^{1/4}$	0	0	0	0
Crotch Length	$-3/8$	$-3/8$	$-5/8$	$-5/8$	$30^{5/8}$	$+5/8$	$+3/4$	$+3/4$	0
Arm Circumference	$-3/8$	$-1/2$	$-5/8$	$-5/8$	$12^{1/2}$	$+5/8$	$+7/8$	$+7/8$	0
Scye Circumference	$-3/8$	$-3/8$	$-1/2$	$-1/2$	$20^{1/8}$	$+1/2$	$+5/8$	$+5/8$	0
Thigh Circumference	$-3/4$	$-3/4$	$-1^{1/8}$	$-1^{1/8}$	$26^{1/4}$	$+1^{1/8}$	$+1^{1/2}$	$+1^{1/2}$	0
Rise	$-1/8$	$-1/8$	$-1/8$	$-1/8$	$12^{1/8}$	$+1/8$	$+1/8$	$+1/8$	$+1/8$
Bust Circumference	-1	-1	$-1^{1/2}$	$-1^{1/2}$	$37^{1/2}$	$+1^{1/2}$	+2	+2	+2
Waist Circumference	-1	-1	$-1^{1/2}$	$-1^{1/2}$	$29^{1/2}$	$+1^{1/2}$	+2	+2	+2
Hip Circumference	-1	-1	$-1^{1/2}$	$-1^{1/2}$	40	$+1^{1/2}$	+2	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Women's
Petite

	6	8	10	12	14	16	18
Neck Circumference	-1^8	-1^4	-1^4	14^8	$+1^4$		
Shoulder Circumference	-2^8	-1^4	-1^4	42^{12}	$+1^4$	$+1^4$	$+1^4$
Chest Circumference at Seye	-3^4	-1^4	-1^4	35^8	$+1^4$	0	0
Chest Circumference below Bust	-3^4	-1	-1	31^8	+1	$+1^4$	$+1^4$
Waist Back Length	-1^4	-1^4	-1^4	15^8	$+1^4$	$+1^4$	$+1^4$
Sleeve Outseam*	-1^4	-1^4	-1^4	22^{58}	$+1^4$	$+1^4$	$+1^4$
Sleeve Length*	-1^4	-3^8	-3^8	32^{34}	$+3^8$	$+1^2$	$+1^2$
Sleeve Inseam*	0	0	0	17^{12}	0	0	0
Waist Height	-1^8	-1^8	-1^8	42^{14}	$+1^8$	$+1^8$	$+1^8$
Crotch Height	0	0	0	32^{14}	0	0	0
Crotch Length	-3^8	-5^8	-5^8	28^{14}	$+5^8$	0	0
Arm Circumference	-1^2	-5^8	-5^8	14^{58}	$+5^8$	0	0
Seye Circumference	-3^8	-1^2	-1^2	19^{58}	$+1^2$	0	0
Thigh Circumference	-3^4	-1^8	-1^8	28^{38}	$+1^8$	0	0
Rise	-1^8	-1^8	-1^8	10^{12}	$+1^8$	$+1^2$	$+1^8$
Bust Circumference	-1	-1^{12}	-1^{12}	37^{12}	$+1^{12}$	+2	+2
Waist Circumference	-1	-1^{12}	-1^{12}	29^{12}	$+1^{12}$	+2	+2
Hip Circumference	-1	-1^{12}	-1^{12}	42	$+1^{12}$	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Women's
Regular

	6	8	10	12	14	16	18
Neck Circumference	-1^8	-1^4	-1^4	14^78	$+1^4$	$+3^8$	$+3^8$
Shoulder Circumference	-2^8	-1^14	-1^14	42^12	$+1^14$	$+1^34$	$+1^14$
Chest Circumference at Seye	-2^8	-1^14	-1^14	36	$+1^14$	0	0
Chest Circumference below Bust	-3^4	-1	-1	31^78	+1	$+1^14$	$+1^14$
Waist Back Length	-1^4	-1^4	-1^4	16^18	$+1^4$	$+1^4$	$+1^4$
Sleeve Outseam*	-1^4	-1^4	-1^4	23^58	$+1^4$	$+1^4$	$+1^4$
Sleeve Length*	-1^4	-3^8	-3^8	33^34	$+3^8$	$+1^2$	$+1^2$
Sleeve Inseam*	0	0	0	18^12	0	0	0
Waist Height	-1^5	-1^8	-1^8	44^38	$+1^5$	$+1^8$	$+1^8$
Crotch Height	0	0	0	33^14	0	0	0
Crotch Length	-3^8	-5^8	-5^8	29^34	$+5^8$	0	0
Arm Circumference	-1^2	-5^8	-5^8	13^58	$+5^8$	0	0
Seye Circumference	-3^8	-1^2	-1^2	19^34	$+1^2$	0	0
Thigh Circumference	-3^4	-1^18	-1^18	28^14	$+1^18$	0	0
Rise	-1^5	-1^8	-1^8	11^18	$+1^8$	$+1^8$	$+1^8$
Bust Circumference	-1	-1^12	-1^12	37^12	$+1^12$	+2	+2
Waist Circumference	-1	-1^12	-1^12	29^12	$+1^12$	+2	+2
Hip Circumference	-1	-1^12	-1^12	42	$+1^12$	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Women's
Tall

	6	8	10	12	14	16	18
Neck Circumference	$_{-1}^8$	$_{-1}^4$	$_{-1}^4$	$14^{7.8}$	$+1^4$	$+3^8$	$+3^8$
Shoulder Circumference	$_{-2}^8$	$-1^{1.4}$	$-1^{1.4}$	$42^{1.2}$	$+1^{1.4}$	$+1^{3.4}$	$+1^{3.4}$
Chest Circumference at Seye	$_{-2}^8$	$-1^{1.4}$	$-1^{1.4}$	$36^{1.8}$	$+1^{1.4}$	0	0
Chest Circumference below Bust	$_{-3}^4$	-1	-1	$31^{-.8}$	+1	$+1^{1.4}$	$+1^{1.4}$
Waist Back Length	$_{-1}^4$	$_{-1}^4$	$_{-1}^4$	$17^{1.8}$	$+1^4$	$+1^4$	$+1^4$
Sleeve Outseam*	$_{-1}^4$	$_{-1}^4$	$_{-1}^4$	$24^{5.8}$	$+1^4$	$+1^4$	$+1^4$
Sleeve Length*	$_{-1}^4$	$_{-3}^8$	$_{-3}^8$	$34^{3.4}$	$+3^8$	$+1^2$	$+1^2$
Sleeve Inseam*	0	0	0	$19^{1.2}$	0	0	0
Waist Height	$_{-1}^8$	$_{-1}^8$	$_{-1}^8$	$46^{3.8}$	$+1^8$	$+1^8$	$+1^8$
Crotch Height	0	0	0	$34^{1.4}$	0	0	0
Crotch Length	$_{-3}^8$	$_{-5}^8$	$_{-5}^8$	$31^{5.8}$	$+5^8$	0	0
Arm Circumference	$_{-1}^2$	$_{-5}^8$	$_{-5}^8$	$13^{1.4}$	$+5^8$	0	0
Seye Circumference	$_{-3}^8$	$_{-1}^2$	$_{-1}^2$	20	$+1^2$	0	0
Thigh Circumference	$_{-3}^4$	$-1^{1.8}$	$-1^{1.8}$	28	$+1^{1.8}$	0	0
Rise	$_{-1}^8$	$_{-1}^8$	$_{-1}^8$	$12^{1.8}$	$+1^8$	$+1^8$	$+1^8$
Bust Circumference	-1	$-1^{1.2}$	$-1^{1.2}$	$37^{1.2}$	$+1^{1.2}$	+2	+2
Waist Circumference	-1	$-1^{1.2}$	$-1^{1.2}$	$29^{1.2}$	$+1^{1.2}$	+2	+2
Hip Circumference	-1	$-1^{1.2}$	$-1^{1.2}$	42	$+1^{1.2}$	+2	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Junior
Petite

	10	12	14	16
Neck Circumference	-1^4	$14^{7/8}$	$+1^4$	$+3^8$
Shoulder Circumference	$-1^{1/4}$	$42^{1/2}$	$+1^{1/4}$	$+1^{3/4}$
Chest Circumference at Seye	$-1^{1/4}$	$35^{1/2}$	$+1^{1/4}$	$1^{5/8}$
Chest Circumference below Bust	-1	$31^{7/8}$	+1	$+1^{1/4}$
Waist Back Length	-1^4	$15^{1/8}$	$+1^4$	$+1^4$
Sleeve Outseam*	-1^4	$22^{5/8}$	$+1^4$	$+1^4$
Sleeve Length*	-3^8	$32^{3/4}$	$+3^8$	$+1^{1/2}$
Sleeve Inseam*	0	$17^{1/2}$	0	0
Waist Height	-1^8	$42^{1/4}$	$+1^8$	$+1^8$
Crotch Height	0	$32^{1/4}$	0	0
Crotch Length	-1^2	27	$+5^8$	$+3^4$
Arm Circumference	-5^8	$12^{3/4}$	$+5^8$	$+7^8$
Seye Circumference	-1^2	20	$+1^2$	$+5^8$
Thigh Circumference	$-2^{1/8}$	$25^{1/2}$	$+1^{1/8}$	$1^{1/2}$
Rise	-1^8	$10^{1/2}$	$+1^8$	$+1^8$
Bust Circumference	$-1^{1/2}$	$37^{1/2}$	$+1^{1/2}$	+2
Waist Circumference	$-1^{1/2}$	$29^{1/2}$	$+1^{1/2}$	+2
Hip Circumference	$-1^{1/2}$	38	$+1^{1/2}$	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Junior Regular				
	10	12	14	16
Neck Circumference	$-1^{\frac{1}{4}}$	$14^{\frac{7}{8}}$	$+1^{\frac{1}{4}}$	$+1^{\frac{3}{8}}$
Shoulder Circumference	$-1^{\frac{1}{4}}$	$42^{\frac{1}{2}}$	$+1^{\frac{1}{4}}$	$+1^{\frac{3}{4}}$
Chest Circumference at Scye	$-1^{\frac{1}{4}}$	$35^{\frac{1}{2}}$	$+1^{\frac{1}{4}}$	$1^{\frac{5}{8}}$
Chest Circumference below Bust	-1	$32^{\frac{7}{8}}$	+1	$+1^{\frac{1}{4}}$
Waist Back Length	$-1^{\frac{1}{4}}$	$16^{\frac{1}{8}}$	$+1^{\frac{1}{4}}$	$+1^{\frac{1}{4}}$
Sleeve Outseam*	$-1^{\frac{1}{4}}$	$23^{\frac{5}{8}}$	$+1^{\frac{1}{4}}$	$+1^{\frac{1}{4}}$
Sleeve Length*	$-1^{\frac{3}{8}}$	$33^{\frac{1}{4}}$	$+1^{\frac{3}{8}}$	$+1^{\frac{1}{2}}$
Sleeve Inseam*	0	$18^{\frac{1}{2}}$	0	0
Waist Height	$-1^{\frac{1}{8}}$	$44^{\frac{1}{8}}$	$+1^{\frac{1}{8}}$	$+1^{\frac{1}{8}}$
Crotch Height	0	$33^{\frac{1}{4}}$	0	0
Crotch Length	$-1^{\frac{1}{2}}$	28	$+1^{\frac{5}{8}}$	$+1^{\frac{1}{4}}$
Arm Circumference	$-1^{\frac{5}{8}}$	$12^{\frac{3}{8}}$	$+1^{\frac{5}{8}}$	$+1^{\frac{7}{8}}$
Scye Circumference	$-1^{\frac{1}{2}}$	20	$+1^{\frac{1}{2}}$	$+1^{\frac{5}{8}}$
Thigh Circumference	$-1^{\frac{1}{8}}$	$25^{\frac{1}{4}}$	$+1^{\frac{1}{8}}$	$1^{\frac{1}{2}}$
Rise	$-1^{\frac{1}{8}}$	$11^{\frac{1}{8}}$	$+1^{\frac{1}{8}}$	$+1^{\frac{1}{8}}$
Bust Circumference	$-1^{\frac{1}{2}}$	$37^{\frac{1}{2}}$	$+1^{\frac{1}{2}}$	+2
Waist Circumference	$-1^{\frac{1}{2}}$	$29^{\frac{1}{2}}$	$+1^{\frac{1}{2}}$	+2
Hip Circumference	$-1^{\frac{1}{2}}$	38	$+1^{\frac{1}{2}}$	+2

*Body measurement

TABLE 4. Proposed Sizing System for Navy Women's Clothing (cont'd)

Junior Tall				
	10	12	14	16
Neck Circumference	$-.1/4$	$14^{7/8}$	$+1/4$	$+3/8$
Shoulder Circumference	$-1^{1/4}$	$42^{1/2}$	$+1^{1/4}$	$+1^{3/4}$
Chest Circumference at Seye	$-1^{1/4}$	$35^{5/8}$	$+1^{1/8}$	$1^{5/8}$
Chest Circumference below Bust	-1	$31^{7/8}$	$+1$	$+1^{1/4}$
Waist Back Length	$-.1/4$	$17^{1/8}$	$+1/4$	$+1/4$
Sleeve Outseam*	$-.1/4$	$24^{5/8}$	$+1/4$	$+1/4$
Sleeve Length*	$-.3/8$	$34^{3/4}$	$+3/8$	$+1/2$
Sleeve Inseam*	0	$19^{1/2}$	0	0
Waist Height	$-.1/8$	$46^{3/8}$	$+1/8$	$+1/8$
Crotch Height	0	$33^{1/4}$	0	0
Crotch Length	$-.1/2$	$29^{7/8}$	$+5/8$	$+3/4$
Arm Circumference	$-.5/8$	12	$+5/8$	$+7/8$
Seye Circumference	$-.1/2$	$20^{1/4}$	$+1/2$	$+5/8$
Thigh Circumference	$-1^{1/8}$	25	$+1^{1/8}$	$1^{1/2}$
Rise	$-.1/8$	$12^{1/8}$	$+1/8$	$+1/8$
Bust Circumference	$-1^{1/2}$	$37^{1/2}$	$+1^{1/2}$	+2
Waist Circumference	$-1^{1/2}$	$29^{1/2}$	$+1^{1/2}$	+2
Hip Circumference	$-1^{1/2}$	38	$+1^{1/2}$	+2

*Body measurement

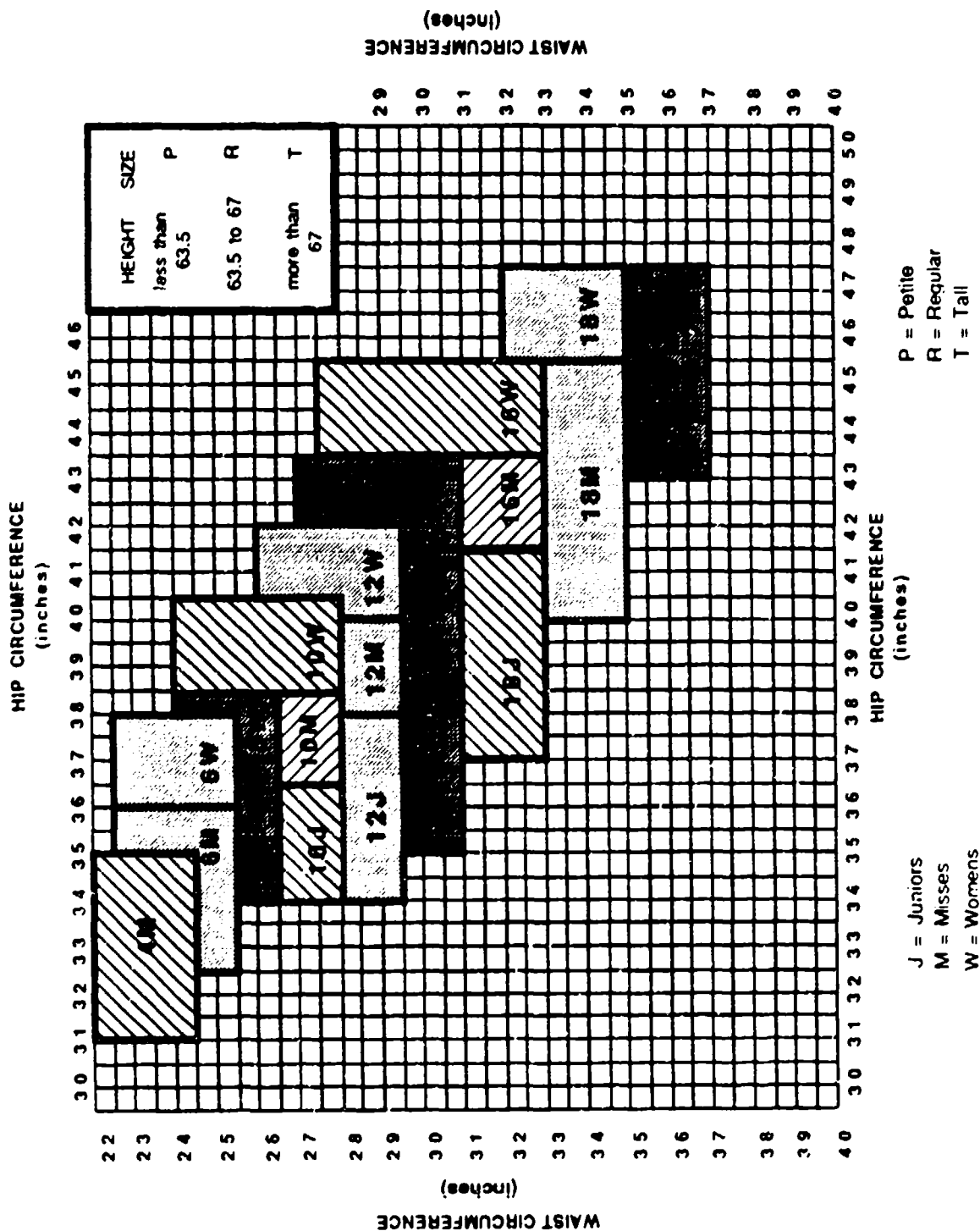
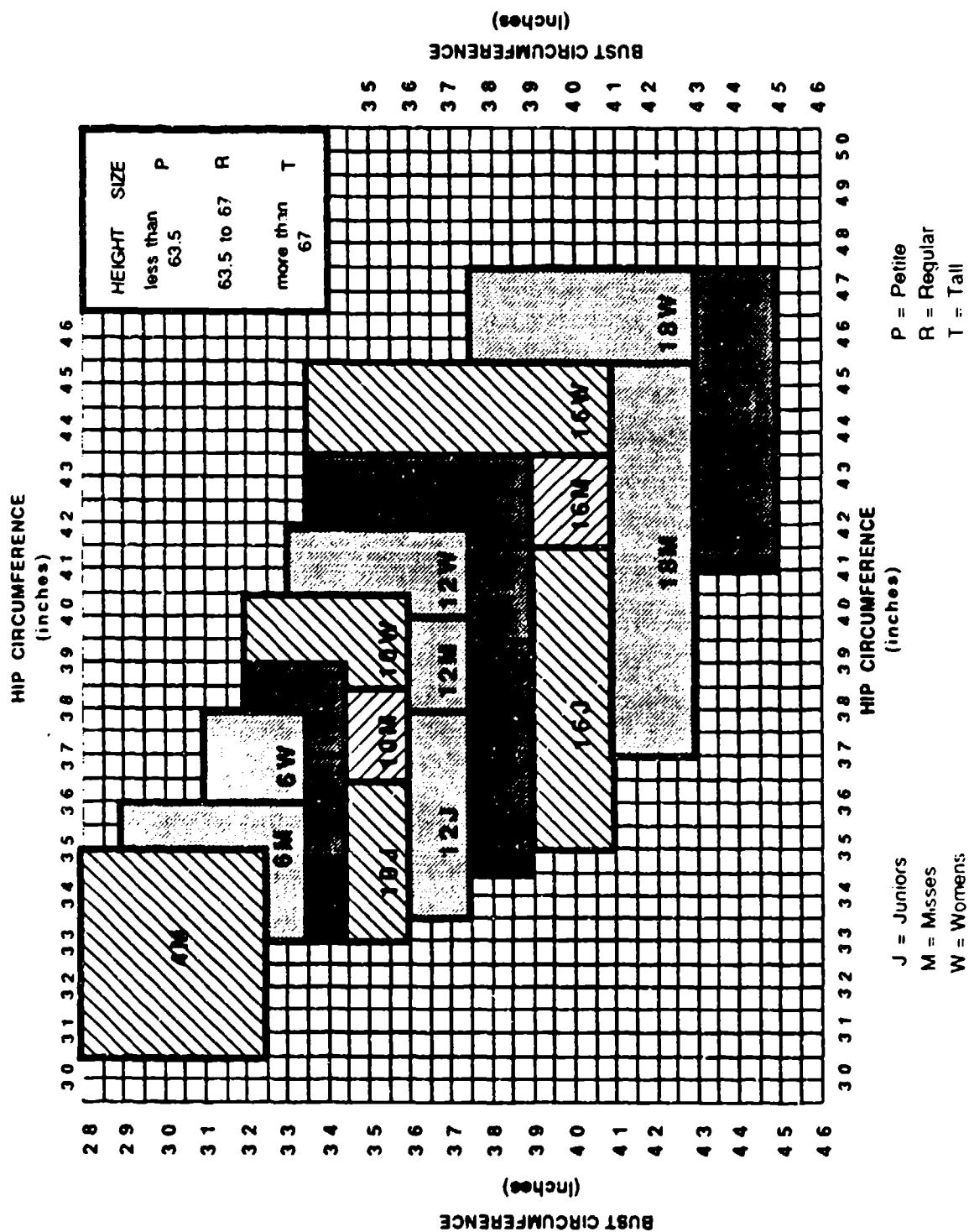


Figure 5
 Final Size Prediction Chart for Lower Body Garments. (Inches)



REFERENCE

Mellian, Sirvart A., Cay A. Ervin, and Kathleen A. Robinette, 1990, Sizing Evaluation of Navy Women's Uniforms, NCTRF/TR No. 182, Navy Clothing and Textile Research Facility, Natick, Massachusetts. (In press.)

APPENDIX A

MEASUREMENT DESCRIPTIONS

Weight	Weight to the nearest 0.25 pound of a subject standing on the center of a balance scale platform.
Height	The vertical distance from the floor to the top of the head.
Neck Circumference	The circumference of the base of the neck (this circumference is not in a plane perpendicular to the axis of the neck).
Shoulder Circumference	The horizontal circumference of the shoulders measured at the level of the greatest lateral protrusion of the deltoid muscles.
Chest Circumference at Scye	The horizontal circumference of the trunk measured with the tape high in the armpits.
Bust Circumference	The horizontal circumference of the trunk measured with the tape passing over the bra points.
Chest Circumference below Bust	The horizontal circumference of the trunk measured at a level just below the cups of the bra.
Waist Circumference	The horizontal circumference of the waist at the "natural" waist level.
Hip Circumference	The maximum circumference of the hips at the level of the maximum posterior protrusion of the buttocks.
Waist Back Length	The surface distance from the waist to cervicale.
Sleeve Inseam	The distance from the anterior edge of the armpit to the little finger side of the wrist measured with the arm slightly abducted, the palm held forward, and the tape tense.
Sleeve Outseam	The distance from acromiale to the thumb side of the wrist measured with the arm slightly abducted, the palm held forward, and the tape tense.

APPENDIX A

MEASUREMENT DESCRIPTIONS (Cont'd.)

Sleeve Length	A tape with its zero point on the midline of the spine is passed horizontally around the right shoulder and over the tip of the elbow to the wrist landmark. The measurement is made while the subject holds her arms up in a horizontal position parallel to the standing surface and joins them by bringing the fists together at the metacarpophalangeal and proximal interphalangeal knuckles. The forearms and fists are in a straight line.
Waist Height (outseam)	The vertical distance from the floor to the natural waist level.
Crotch Height (inseam)	The vertical distance from the floor to the midpoint of the crotch.
Upper Thigh Circumference	The circumference of the leg in a plane perpendicular to its axis measured at the level of the lowest point of the gluteal furrow.
Seye Circumference	The circumference of the seye measured with the tape passing through the armpit and over acromion.
Crotch Length	The surface distance measured from the waistfront at the level of the natural waist through the crotch to the waist back at the same level.
Forearm Circumference	The maximum circumference of the lower arm as measured in a plane perpendicular to its long axis. The elbow is flexed 90 degrees, the upper arm is horizontal, and the fist is tightly clenched.

APPENDIX B

PRELIMINARY SIZING TABLES IN DEVELOPMENT
OF A SIZING PROGRAM FOR NAVY WOMEN'S UNIFORMS

TABLE B-1. Regressed Means

Size 4

	Petite						Regular						Tall			
	Misses			Women's			Misses			Women's			Misses		Women's	
	Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks	Whites	Blacks
Neck Circumference	12.51	12.57		12.51	12.72		12.65	12.77		12.65	12.91		12.80	12.96	12.80	13.10
Shoulder Circumference	38.04	38.32		38.52	38.99		38.18	38.67		38.66	39.35		38.31	39.03	38.81	39.70
Chest Circumference at Scye	31.58	31.44		31.81	31.75		31.70	31.68		31.92	31.98		31.82	31.91	32.04	32.33
Chest Circumference below Bust	28.25	27.69		28.32	27.89		28.41	27.89		28.48	28.09		28.56	28.09	28.63	28.29
Waist Back Length	15.71	15.48		15.73	15.52		16.40	16.20		16.42	16.25		17.10	16.93	17.12	16.97
Sleeve Outseam	21.70	22.40		21.70	22.53		22.91	23.67		22.91	23.81		24.11	24.94	24.12	25.07
Sleeve Length	30.88	31.48		30.90	31.65		32.28	33.03		32.31	33.20		33.69	34.58	33.71	34.75
Sleeve Inseam	17.28	17.98		17.29	18.03		18.34	19.28		18.35	19.34		19.39	20.59	19.41	20.65
Waist Height	39.54	39.93		39.50	40.06		41.99	42.42		41.95	42.55		44.44	44.92	44.41	45.05
Crotch Height	29.13	30.24		28.87	30.01		31.18	32.42		30.92	32.19		33.23	34.60	32.97	34.36
Crotch Length	26.27	25.65		27.31	27.60		26.85	25.62		27.88	27.56		27.42	25.59	28.46	27.53
Arm Circumference	9.69	9.88		10.46	10.38		9.32	9.34		10.09	9.84		8.95	8.80	9.71	9.30
Scye Circumference	15.14	14.81		14.99	14.99		15.29	14.61		15.14	14.79		15.44	14.42	15.29	14.60
Thigh Circumference	20.55	21.11		22.56	22.90		20.19	20.89		22.19	22.68		19.82	20.68	21.83	22.47
Rise	10.40	9.68		10.62	10.06		10.80	9.98		11.03	10.35		11.21	10.27	11.43	10.65

TABLE B-1. Regressed Means (cont'd)

Size 6

	Petite						Regular						Tall					
	Misses			Women's			Misses			Women's			Misses			Women's		
	Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks	
Neck Circumference	12.67	12.75		12.67	12.89		12.81	12.94		12.81	13.09		12.96	13.13		12.96	13.28	
Shoulder Circumference	38.91	39.15		39.38	39.82		39.05	39.50		39.53	40.18		39.20	39.86		39.68	40.53	
Chest Circumference at Scye	32.38	32.23		32.61	32.54		32.50	32.47		32.73	32.77		32.62	32.71		32.85	33.01	
Chest Circumference below Bust	28.97	28.39		29.04	28.59		29.13	28.59		29.20	28.79		29.28	28.79		29.35	28.99	
Waist Back Length	15.72	15.49		15.73	15.54		16.41	16.22		16.43	16.26		17.10	16.94		17.12	16.98	
Sleeve Outseam	21.75	22.47		21.75	22.60		22.96	23.74		22.96	23.87		24.17	25.01		24.17	25.14	
Sleeve Length	31.02	31.63		31.05	31.79		32.43	33.18		32.45	33.34		33.83	34.73		33.85	34.90	
Sleeve Inseam	17.22	17.93		17.24	17.99		18.28	19.24		18.30	19.29		19.34	20.54		19.35	20.60	
Waist Height	39.56	39.92		39.52	40.05		42.01	42.42		41.98	42.55		44.47	44.91		44.43	45.04	
Crotch Height	29.09	30.16		28.83	29.92		31.14	32.33		30.88	32.10		33.18	34.51		32.92	34.28	
Crotch Length	26.63	26.03		27.66	27.96		27.20	25.99		28.23	27.93		27.78	25.95		28.81	27.99	
Arm Circumference	10.13	10.33		10.89	10.83		9.75	9.79		10.52	10.29		9.36	9.25		10.15	9.74	
Sleeve Circumference	15.48	15.33		15.33	15.51		15.63	15.14		15.48	15.32		15.78	14.95		15.62	15.13	
Thigh Circumference	21.28	21.84		23.29	23.63		20.91	21.63		22.92	23.42		20.54	21.42		22.55	23.21	
Rise	10.46	9.76		10.69	10.14		10.87	10.06		11.09	10.43		11.27	10.36		11.50	10.73	

TABLE B-1. Regressed Means (cont'd)

Size 8

	Petite						Regular						Tall					
	Misses			Women's			Misses			Women's			Misses			Women's		
	Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks	
Neck Circumference	12.83	12.92		12.83	13.07		12.98	13.11		12.98	13.26		13.12	13.30		13.12	13.45	
Shoulder Circumference	39.77	39.98		40.25	40.65		39.92	40.33		40.40	41.01		40.06	40.69		40.54	41.36	
Chest Circumference at Scye	33.18	33.02		33.41	33.33		33.30	33.26		33.53	33.56		33.42	33.50		33.65	33.80	
Chest Circumference below Bust	29.69	29.09		29.76	29.29		29.85	29.29		29.92	29.49		30.00	29.49		30.07	29.69	
Waist Back Length	15.72	15.51		15.74	15.55		16.41	16.23		16.43	16.27		17.11	16.95		17.12	16.99	
Sleeve Outseam	21.80	22.54		21.80	22.67		23.01	23.81		23.01	23.94		24.22	25.07		24.22	25.20	
Sleeve Length	31.17	31.77		31.19	31.94		32.57	33.32		32.59	33.49		33.97	34.88		34.00	35.04	
Sleeve Inseam	17.17	17.88		17.18	17.94		18.23	19.19		18.24	19.25		19.24	20.50		19.30	20.56	
Waist Height	39.58	39.92		39.54	40.05		42.03	42.41		42.00	42.54		44.49	44.90		44.45	45.03	
Crotch Height	29.04	30.07		28.78	29.84		31.09	32.25		30.83	32.01		33.14	34.42		32.88	34.15	
Crotch Length	26.98	26.39		28.01	28.33		27.55	26.36		28.59	28.29		28.13	26.32		29.16	28.26	
Arm Circumference	10.56	10.78		11.33	11.28		10.19	10.23		10.96	10.73		9.82	9.69		10.59	10.19	
Syee Circumference	15.82	15.85		15.66	16.03		15.97	15.66		15.81	15.84		16.12	15.47		15.96	15.65	
Thigh Circumference	22.00	22.57		24.01	24.36		21.63	22.36		23.64	24.15		21.26	22.15		23.27	23.94	
Rise	10.53	9.84		10.76	10.22		10.93	10.14		11.16	10.52		11.34	10.44		11.57	10.81	

TABLE B-1. Regional Means (cont'd)

Site 10

	Pete						Regular						Tab					
	Males			Women's			Males			Women's			Males			Women's		
	White	Black	White	Black	White	Black	White	Black	White	Black	White	Black	White	Black	White	Black	White	Black
Neck Circumference	13.07	13.18	12.07	13.53	13.06	13.57	13.22	13.37	13.22	13.32	13.22	13.27	13.36	13.56	13.36	13.71	13.36	13.46
Shoulder Circumference	41.07	41.22	41.55	41.89	40.76	41.58	41.22	41.58	41.70	42.23	40.90	41.13	41.37	41.93	41.37	41.84	41.05	41.48
Chest Circumference at Scye	34.39	34.23	34.61	34.54	34.24	34.03	34.51	34.47	34.73	34.77	34.36	34.26	34.63	34.71	34.63	35.01	34.47	34.56
Chest Circumference below Bust	30.77	30.14	30.84	30.34	30.73	30.01	30.93	30.34	31.00	30.54	30.88	30.21	31.08	30.54	31.08	31.15	31.09	30.41
Waist Back Length	15.73	15.32	15.74	15.56	15.71	15.50	16.42	16.24	16.44	16.29	16.41	16.22	17.11	16.97	17.11	17.13	17.10	16.94
Shoulder to Waist	21.84	22.64	21.88	22.77	21.88	22.55	23.09	23.91	23.09	24.04	23.08	23.82	24.29	23.18	24.29	23.31	24.29	23.09
Shoulder Length	31.38	31.99	31.40	32.16	31.37	31.86	32.78	33.54	32.81	33.71	32.77	33.43	34.19	33.10	34.21	33.36	34.17	34.99
Shoulder to Waist	17.08	17.82	17.10	17.87	17.06	17.78	18.14	19.12	18.16	19.18	18.15	19.08	19.20	20.43	19.22	20.49	19.19	20.39
Waist Height	39.81	39.91	39.57	40.04	39.63	39.87	42.06	42.40	42.03	42.53	42.09	42.31	44.52	44.89	44.48	45.02	44.54	44.89
Crotch Height	28.97	29.94	28.72	29.70	29.15	30.09	31.02	32.11	30.76	31.88	31.20	32.37	33.07	33.07	33.81	34.06	33.24	34.45
Crotch Length	27.51	28.94	28.54	28.88	28.82	29.63	28.08	28.91	29.11	28.84	27.36	28.61	28.66	28.67	29.69	28.81	27.93	28.59
Arm Circumference	11.22	11.44	11.99	11.94	10.71	11.11	10.85	10.90	11.62	11.40	10.33	10.57	10.47	10.36	11.25	10.86	9.96	10.09
Sleeve Circumference	16.33	16.64	16.17	16.82	16.41	16.51	16.47	16.45	16.32	16.63	16.56	16.32	16.62	16.26	16.47	16.44	16.73	16.14
Thigh Circumference	23.08	23.67	25.09	25.46	21.74	22.48	22.71	23.46	24.72	25.25	21.37	22.26	22.34	23.25	24.35	23.04	21.00	22.05
Shin	10.63	9.95	10.84	10.34	10.48	9.71	11.03	10.26	11.26	10.64	10.88	10.01	11.44	10.56	11.67	10.94	11.29	10.31

TABLE B-1. Regressed Means (cont'd)

	Juniata						Regular						Tail					
	Men's			Women's			Men's			Women's			Men's			Women's		
	White	Black	Mean	White	Black	Mean	White	Black	Mean	White	Black	Mean	White	Black	Mean	White	Black	Mean
Neck Circumference	13.31	13.43	13.37	13.31	13.34	13.33	13.63	13.46	13.55	13.46	13.78	13.62	13.60	13.82	13.71	13.60	13.97	13.79
Shoulder Circumference	42.35	42.47	42.41	42.85	43.14	42.99	42.82	43.00	42.93	42.00	43.40	42.70	42.67	43.18	42.93	42.67	43.85	43.26
Chest Circumference at Scye	35.50	35.42	35.46	35.82	35.72	35.77	35.66	35.94	35.80	35.04	35.96	35.50	35.83	35.89	35.86	35.83	36.20	36.02
Chest Circumference below Bust	31.85	31.19	31.52	31.92	31.39	31.65	31.39	32.08	31.59	31.06	31.57	31.32	31.39	31.59	31.45	31.23	31.78	31.51
Waist Back Length	15.73	15.54	15.64	15.75	15.58	15.67	16.43	16.26	16.35	15.72	16.20	16.43	16.26	16.43	16.35	16.26	16.43	16.35
Sleeve (Underarm)	21.95	22.74	22.34	21.95	22.87	22.41	23.16	24.01	23.59	21.95	22.65	22.30	23.16	24.01	23.59	24.37	25.41	24.89
Sleeve Length	31.60	32.21	31.91	31.62	32.38	32.00	33.76	33.02	33.39	31.58	32.10	31.84	33.02	33.76	33.39	34.40	35.48	34.94
Sleeve Opening	17.00	17.75	17.38	17.02	17.80	17.41	18.06	19.05	18.56	16.99	17.70	17.34	18.06	19.05	18.56	19.12	20.42	19.77
Waist Height	39.64	39.69	39.67	39.60	40.02	39.81	42.09	42.39	42.24	39.66	39.81	39.74	42.09	42.39	42.24	44.55	45.01	44.78
Crotch Height	28.90	29.81	29.36	28.65	29.57	29.11	30.95	31.98	31.47	29.08	29.96	29.52	30.95	31.98	31.47	33.00	33.95	33.48
Crotch Length	28.03	27.49	27.76	29.07	29.43	29.25	28.61	27.46	28.04	27.34	26.20	26.77	28.61	27.46	28.04	29.18	29.36	29.27
Arm Circumference	11.87	12.11	12.00	12.64	12.61	12.63	11.50	11.57	11.54	11.36	11.78	11.57	11.50	11.57	11.54	11.13	11.53	11.33
Sleeve Circumference	16.83	17.42	17.13	16.68	17.61	17.15	16.98	17.23	17.11	16.94	17.30	17.12	16.98	17.23	17.11	17.13	17.22	17.18
Thigh Circumference	24.17	24.77	24.47	25.18	25.56	25.37	23.80	24.56	24.18	22.83	23.57	23.20	23.80	24.56	24.18	23.43	24.34	23.89
Heel	10.73	10.08	10.41	10.06	10.46	10.26	11.13	10.38	10.76	10.58	9.83	10.58	11.13	10.38	10.76	11.54	11.06	11.30

TABLE B-1 Regional Means (cont'd)

Sex 14

	Peak						Regular						Tall					
	Men's			Women's			Men's			Women's			Men's			Women's		
	Whites	Blacks	Blacks	Whites	Blacks	Blacks	Whites	Blacks	Blacks	Whites	Blacks	Blacks	Whites	Blacks	Blacks	Whites	Blacks	Blacks
Neck Circumference	13.56	13.70	13.84	13.56	13.60	13.70	13.89	13.70	14.04	13.70	13.79	13.85	13.85	14.23	13.85	13.85	13.98	13.98
Shoulder Circumference	43.68	43.71	44.15	43.36	43.26	43.82	44.07	44.30	44.74	43.50	43.61	43.97	44.45	45.09	43.97	43.97	43.97	43.97
Chest Circumference at Sore	36.79	36.61	37.02	36.91	36.40	35.91	36.84	37.14	37.15	36.76	36.64	37.03	37.08	37.39	36.88	36.88	36.88	36.88
Chest Circumference below Bust	32.93	32.74	33.00	32.44	32.11	31.09	32.44	33.16	32.64	33.04	32.31	33.24	32.64	32.83	32.20	32.51	32.51	32.51
Waist Back Length	15.74	15.56	15.76	15.60	15.53	16.43	16.28	16.45	16.12	16.42	16.25	17.13	17.00	17.04	17.11	16.97	16.97	16.97
Waist Circumf.	22.03	22.84	22.03	22.97	22.75	23.24	24.11	23.74	24.24	23.24	24.02	24.45	25.38	24.45	24.45	24.45	23.29	23.29
Sleeve Length	31.81	32.43	31.83	32.60	32.32	33.21	33.98	33.24	34.15	33.20	33.87	34.62	35.53	34.64	34.70	34.60	35.42	35.42
Sleeve Length	16.92	17.68	16.95	17.75	17.64	17.98	18.08	17.99	19.04	17.97	18.95	19.04	20.29	19.03	20.35	19.03	20.25	20.25
Waist Height	39.67	39.58	39.63	40.01	39.80	42.12	42.38	42.09	42.51	42.15	42.29	44.58	44.87	44.54	45.00	44.60	44.78	44.78
Crotch Height	28.84	29.68	28.58	29.44	29.83	30.89	31.85	30.63	31.62	31.06	31.01	32.93	34.03	32.67	33.79	33.11	34.18	34.18
Crotch Length	28.56	28.04	29.59	29.98	28.75	29.14	28.00	30.17	29.94	28.45	28.71	29.71	27.97	30.74	29.91	29.02	26.68	26.68
Arm Circumference	17.53	12.78	13.30	13.28	12.45	12.16	12.24	12.93	12.74	11.65	11.91	11.79	11.70	12.56	12.27	11.28	11.36	11.36
Sore Circumference	17.14	18.21	17.18	18.39	17.44	17.49	18.02	17.33	18.20	17.59	17.90	17.64	17.83	17.46	18.01	17.74	17.71	17.71
Thigh Circumference	25.25	25.87	27.26	27.66	23.91	24.88	25.66	26.89	27.45	23.54	24.46	24.51	25.44	26.52	27.23	23.17	24.25	24.25
Rise	10.83	10.20	11.06	10.58	9.95	11.25	10.56	11.46	10.88	11.08	10.25	11.64	10.80	11.87	11.18	11.49	10.55	10.55

TABLE B-1. Regressed Means (cont'd)

Size 16

	Petite						Regular						Tall					
	Misses			Women's			Misses			Women's			Misses			Women's		
	Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks		Whites	Blacks	
Neck Circumference	13.88	14.04		13.88	13.94		14.02	14.23		14.02	14.14		14.17	14.42		14.17	14.33	
Shoulder Circumference	45.41	43.57		45.09	44.92		45.56	45.73		45.24	45.28		45.70	46.08		45.38	45.63	
Chest Circumference at Syle	38.40	38.19		38.25	37.99		38.52	38.43		38.37	38.22		38.64	38.66		38.49	38.46	
Chest Circumference below Bust	34.38	33.83		34.33	33.70		34.53	34.04		34.48	33.91		34.68	34.25		34.64	34.12	
Waist Back Length	15.75	15.58		15.74	15.55		16.44	16.30		16.43	16.27		17.14	17.02		17.12	17.00	
Sleeve Outseam	22.13	22.08		22.13	22.89		23.34	24.24		23.34	24.16		24.55	25.51		24.55	25.43	
Sleeve Length	32.10	32.72		32.08	32.61		33.50	34.27		33.49	34.16		34.90	35.83		34.89	37.52	
Sleeve Inseam	16.81	17.59		16.80	17.55		17.87	18.89		17.86	18.86		18.93	20.20		18.92	20.16	
Waist Height	39.71	39.87		39.73	39.78		42.17	42.36		42.19	42.27		44.62	44.85		44.64	44.77	
Crotch Height	28.75	29.50		28.92	29.66		30.80	31.68		30.97	31.83		32.84	33.85		33.02	34.01	
Crotch Length	29.26	28.77		28.58	27.41		29.84	28.74		29.15	27.44		30.41	28.70		29.73	27.41	
Arm Circumference	13.40	13.67		12.89	13.34		13.03	13.13		12.52	12.80		12.66	12.59		12.15	12.26	
Syle Circumference	18.01	19.26		18.12	17.14		18.16	19.07		18.27	18.95		18.31	18.87		18.42	18.75	
Thigh Circumference	26.70	27.33		25.36	26.14		26.33	27.12		24.99	25.93		25.96	26.91		24.62	25.72	
Rise	10.96	10.37		10.81	10.11		11.37	10.66		11.22	10.41		11.77	10.96		11.62	10.71	

TABLE B-1. Regressed Means (cont'd)

Size 18

	Petite		Regular		Tall	
	Misses		Misses		Misses *	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
Neck Circumference	14.20	14.39	14.35	14.58	14.49	14.77
Shoulder Circumference	47.15	47.03	47.29	47.38	47.44	47.74
Chest Circumference at Scye	40.00	39.77	40.12	40.01	40.24	40.25
Chest Circumference below Bust	35.82	35.23	35.97	35.44	36.12	35.65
Waist Back Length	15.76	15.60	16.45	16.33	17.15	17.05
Sleeve Outseam	22.24	23.11	23.45	24.38	24.65	25.65
Sleeve Length	32.55	33.01	33.79	34.57	35.19	36.12
Sleeve Inseam	16.70	17.49	17.76	18.80	18.82	20.11
Waist Height	39.75	39.85	42.21	42.35	44.66	44.84
Crotch Height	28.66	29.33	30.71	31.50	32.75	33.68
Crotch Length	29.97	29.51	30.54	29.47	31.12	29.43
Arm Circumference	14.28	14.56	13.91	14.02	13.54	13.48
Scye Circumference	18.69	20.31	18.84	20.11	18.99	19.92
Thigh Circumference	28.14	28.80	27.77	28.58	27.40	28.37
Rise	11.10	10.53	11.50	10.83	11.91	11.12

TABLE B-2 Composite Sizing Program Using Integration of Black and White Values,
With Allowance for Extreme Values

Misses

	Size 4			Size 6			Size 8			Size 10		
	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall
Bust Circumference	32.50	32.50	32.50	33.50	33.50	33.50	34.50	34.50	34.50	36.00	36.00	36.00
Waist Circumference	24.50	24.50	24.50	25.50	25.50	25.50	26.50	26.50	26.50	28.00	28.00	28.00
Hip Circumference	35.00	35.00	35.00	36.00	36.00	36.00	37.00	37.00	37.00	38.50	38.50	38.50
Neck Circumference	13.82	14.02	14.21	14.00	14.19	14.38	14.17	14.36	14.55	14.43	14.62	14.81
Shoulder Circumference	38.04	38.18	38.33	38.91	39.05	39.20	39.77	39.92	40.06	41.07	41.22	41.37
Chest Circumference at Scye	31.58	31.70	31.82	32.38	32.50	32.62	33.18	33.30	33.42	34.39	34.51	34.63
Chest Circumference below Bust	28.25	28.41	28.56	28.97	29.13	29.28	29.69	29.85	30.00	30.77	30.93	31.08
Waist Back Length	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12
Sleeve Outseam*	21.99	23.00	24.01	22.11	23.12	24.13	22.24	23.24	24.25	22.42	23.43	24.44
Sleeve Length*	31.60	32.63	33.66	31.82	32.85	33.88	32.04	33.07	34.10	32.37	33.40	34.44
Sleeve Inseam*	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50
Waist Height	42.92	44.06	46.19	42.98	44.13	46.25	43.05	44.19	46.32	43.15	44.29	46.42
Crotch Height	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26
Crotch Length	25.74	26.76	28.65	26.13	27.15	29.03	26.52	27.53	29.42	27.10	28.11	30.00
Arm Circumference	11.07	10.70	10.33	11.51	11.13	10.76	11.94	11.57	11.20	12.60	12.23	11.85
Scye Circumference	18.11	18.26	18.41	18.45	18.60	18.75	18.79	18.94	19.09	19.30	19.44	19.59
Thigh Circumference	22.98	22.76	22.55	23.71	23.50	23.29	24.44	24.23	24.02	25.54	25.33	25.12
Rise	9.66	10.80	12.93	9.72	10.87	12.99	9.79	10.93	13.06	9.89	11.03	13.16

*Allow 2 inches of extra material not included in these values.

TABLE 11-2. Composite Sizing Program Using Integration of Black and White Values,
With Allowance for Extreme Values (cont'd)

Misses

	Size 12			Size 14			Size 16			Size 18		
	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall
Bust Circumference	37.50	37.50	37.50	39.00	39.00	39.00	41.00	41.00	41.00	43.00	43.00	43.00
Waist Circumference	29.50	29.50	29.50	31.00	31.00	31.00	33.00	33.00	33.00	35.00	35.00	35.00
Hip Circumference	40.00	40.00	40.00	41.50	41.50	41.50	43.50	43.50	43.50	45.50	45.50	45.50
Neck Circumference	14.68	14.88	15.07	14.95	15.14	15.33	15.29	15.48	15.67	15.64	15.83	16.02
Shoulder Circumference	42.34	42.52	42.67	43.68	43.82	43.97	45.41	45.56	45.70	47.15	47.29	47.44
Chest Circumference at Bore	35.59	35.71	35.83	36.79	36.91	37.03	38.40	38.54	38.64	40.00	40.12	40.24
Chest Circumference below Bust	31.85	32.01	32.16	32.93	33.09	33.24	34.38	34.53	34.68	35.82	35.97	36.12
Waist Back Length	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12
Sleeve Outseam*	22.61	23.62	24.62	22.79	23.80	24.81	23.04	24.05	25.06	23.29	24.30	25.30
Sleeve Length*	32.71	33.74	34.77	33.04	34.07	35.10	33.48	34.52	35.55	33.93	34.96	35.99
Sleeve Inseam*	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50
Waist Height	43.25	44.39	46.52	43.34	44.49	46.62	43.48	44.63	46.75	43.62	44.76	46.89
Crotch Height	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26
Crotch Length	27.68	28.69	30.58	28.26	29.27	31.17	29.03	30.05	31.94	29.81	30.83	32.72
Arm Circumference	13.25	12.88	12.51	13.91	13.54	13.17	14.78	14.41	14.04	15.66	15.29	14.92
Soye Circumference	19.80	19.95	20.10	20.31	20.46	20.61	20.98	21.13	21.28	21.66	21.81	21.96
Thigh Circumference	26.64	26.43	26.22	27.74	27.53	27.31	29.20	28.99	28.78	30.67	30.45	30.24
Rise	9.99	11.13	13.26	10.09	11.23	13.36	10.22	11.37	13.49	10.36	11.50	13.63

*Allow 2 inches of extra material not included in these values

TABLE B-2 Composite Sizing Program Using Integration of Black and White Values,
With Allowance for Extreme Values (cont'd)

Women's

	Size 4			Size 6			Size 8			Size 10			Size 12			Size 14		
	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall
Bust Circumference	32.50	32.50	32.50	31.50	33.50	33.50	34.50	34.50	34.50	36.00	36.00	36.00	37.50	37.50	37.50	39.00	39.00	39.00
Waist Circumference	24.50	24.50	24.50	25.50	25.50	25.50	26.50	26.50	26.50	28.00	28.00	28.00	29.50	29.50	29.50	31.00	31.00	31.00
Hip Circumference	36.00	36.00	36.00	39.00	39.00	39.00	40.00	40.00	40.00	41.50	41.50	41.50	43.00	43.00	43.00	44.50	44.50	44.50
Neck Circumference	13.97	14.16	14.35	14.14	14.34	14.53	14.32	14.51	14.70	14.58	14.77	14.96	14.83	15.03	15.22	15.09	15.29	15.48
Shoulder Circumference	38.52	38.66	38.81	39.38	39.53	39.68	40.25	40.40	40.54	41.55	41.70	41.84	42.85	43.00	43.14	44.15	44.30	44.45
Chest Circumference at Nape	31.81	31.92	32.04	32.61	32.73	32.85	33.41	33.53	33.65	34.61	34.73	34.85	35.82	35.94	36.06	37.02	37.14	37.26
Chest Circumference below Bust	28.32	28.48	28.63	29.04	29.20	29.35	29.76	29.92	30.07	30.84	31.00	31.15	31.92	32.08	32.23	33.00	33.16	33.31
Waist Back Length	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12
Sleeve Chatham*	21.98	22.98	24.00	22.11	23.11	24.12	22.23	23.24	24.24	22.41	23.42	24.43	22.60	23.61	24.62	22.79	23.79	24.80
Sleeve Length*	31.41	32.41	33.47	31.63	32.66	33.68	31.85	32.88	33.91	32.18	33.21	34.24	32.51	33.54	34.57	32.83	33.86	34.89
Sleeve Inseam*	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50
Waist Height	43.14	44.29	46.41	43.21	44.35	46.48	43.28	44.42	46.55	43.38	44.52	46.65	43.48	44.62	46.75	43.58	44.72	46.85
Crotch Height	11.26	13.26	15.26	13.26	15.26	17.26	13.26	15.26	17.26	13.26	15.26	17.26	13.26	15.26	17.26	13.26	15.26	17.26
Crotch Length	26.81	27.81	29.71	27.20	28.21	30.10	27.59	28.60	30.39	28.17	29.18	31.07	28.75	29.76	31.65	29.33	30.34	32.34
Arm Circumference	11.84	11.47	13.09	12.27	11.91	13.53	12.71	12.34	11.97	13.37	13.00	12.63	14.02	13.65	13.28	14.68	14.31	13.94
Seam Circumference	17.96	18.11	18.26	18.30	18.45	18.59	18.63	18.78	18.93	19.14	19.29	19.44	19.65	19.80	19.95	20.15	20.30	20.45
Thigh Circumference	24.77	24.55	24.34	25.50	25.29	25.08	26.23	26.02	25.81	27.33	27.12	26.91	28.43	28.22	28.01	29.53	29.32	29.10
Rise	9.88	11.03	12.15	9.95	11.09	12.22	10.02	11.16	12.29	10.12	11.26	12.39	10.22	11.36	12.49	10.32	11.46	12.59

* Allow 2 inches of extra material not included in these values

TABLE B-2 Composite Sizing Program Using Integration of Black and White Values,
With Allowance for Extreme Values (cont'd)

Juniors

	Size 10			Size 12			Size 14			Size 16		
	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall	Petite	Regular	Tall
Bust Circumference	36.00	36.00	36.00	37.50	37.50	37.50	39.00	39.00	39.00	41.00	41.00	41.00
Waist Circumference	28.00	28.00	28.00	29.50	29.50	29.50	31.00	31.00	31.00	33.00	33.00	33.00
Hip Circumference	36.50	36.50	36.50	38.00	38.00	38.00	39.50	39.50	39.50	41.50	41.50	41.50
Neck Circumference	14.33	14.52	14.71	14.59	14.78	14.97	14.85	15.04	15.23	15.19	15.39	15.58
Shoulder Circumference	40.76	40.90	41.05	42.06	42.20	42.35	43.36	43.50	43.65	45.09	45.24	45.24
Chest Circumference at Scye	34.24	34.36	34.47	35.44	35.56	35.68	36.63	36.76	36.88	38.25	38.37	38.49
Chest Circumference below Bust	30.73	30.88	31.03	31.81	31.96	32.12	32.89	33.04	33.20	34.33	34.48	34.64
Waist Back Length	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12	15.12	16.12	17.12
Sleeve Outseam*	22.43	23.44	24.44	22.61	23.62	24.63	22.80	23.81	24.82	23.05	24.05	25.06
Sleeve Length*	32.23	33.26	34.29	32.56	33.59	34.62	32.89	33.92	34.95	33.33	34.36	35.39
Sleeve Inseam*	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50	17.50	18.50	19.50
Waist Height	43.00	44.14	46.27	43.10	44.24	46.37	43.20	44.34	46.47	43.33	44.48	46.60
Crotch Height	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26
Crotch Length	26.39	27.40	29.29	26.97	27.98	29.87	27.55	28.56	30.46	28.30	29.34	31.23
Arm Circumference	12.09	11.71	11.34	12.74	12.37	12.00	13.40	13.03	12.66	14.27	13.90	13.53
Scye Circumference	19.40	19.55	19.70	19.91	20.05	20.20	20.41	20.56	20.71	21.09	21.24	21.39
Thigh Circumference	24.35	24.13	23.91	25.44	25.23	25.02	26.54	26.33	26.12	28.01	27.80	27.59
Rise	9.74	10.88	13.01	9.84	10.98	13.11	9.94	11.08	13.21	10.07	11.22	13.34

*Allow 2 inches of extra material not included in these values.